

WHAT IS CLAIMED IS:

1. A circuit pattern inspection method of inspecting a pattern shape on the basis of two-dimensional distribution information of intensities of secondary electrons or reflected electrons obtained by observing a pattern formed on a substrate by a scanning microscope using a charged particle beam, comprising:

a step of detecting a set of edge points indicative of positions of edges of said pattern in a two-dimensional plane from said two-dimensional distribution information by a threshold method;

a step of obtaining an approximation line for the set of edge points belonging to said edges detected; and

a step of obtaining an edge roughness shape by calculating the difference between the set of said edge points and said approximation line.

2. A circuit pattern inspection method of inspecting a pattern shape on the basis of two-dimensional distribution information of intensities of secondary electrons or reflected electrons obtained by observing a pattern formed on a substrate by a scanning microscope using a charged particle beam, comprising:

a step of detecting a set of edge points indicative of positions of line edges of said pattern in a two-dimensional plane from said two-dimensional distribution information;

a step of obtaining an approximation line for the set of

edge points detected for each line edge by least square;

a step of obtaining an edge roughness shape by calculating the difference between the set of said edge points belonging to each line edge and said approximation line; and

5 a step of displaying correlation between edge roughness shapes of different line edges.

3. The circuit pattern inspection method according to claim 1, wherein a plurality of values are used as thresholds used
10 for said threshold method.

4. The circuit pattern inspection method according to claim 3, further comprising a step of calculating a spatial frequency distribution of said edge roughness shape obtained.
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5. The circuit pattern inspection method according to claim 3, further comprising a step of obtaining the degree of said edge roughness by calculating a standard deviation expressed by the square root of an average of root-mean-square values of
20 the differences each between the set of said edge points derived with respect to said plurality of thresholds and said approximation line.

6. The circuit pattern inspection method according to claim 3, further comprising a step of selecting a candidate of a process
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of forming a pattern of said substrate, which causes occurrence of roughness from said edge roughness shape obtained, and displaying the candidate.

5 7. A circuit pattern inspection method comprising:

a step of mounting a sample processed in a line pattern shape at a predetermined pitch on a scanning microscope, observing said sample, and obtaining a two-dimensional intensity distribution of secondary electrons or reflected electrons;

10 a step of calculating a shape of roughness of an edge of said line pattern from said two-dimensional intensity distribution; and

a step of storing said edge roughness shape obtained as image distortion information.

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8. A circuit pattern inspection method comprising:

a step of mounting a sample processed in a line pattern shape at a predetermined pitch on a scanning microscope, observing said sample, and obtaining a first two-dimensional intensity distribution of secondary electrons or reflected electrons;

20 a step of moving an observation position in the direction of a side of said line pattern only by a predetermined length and obtaining a second two-dimensional intensity distribution of secondary electrons or reflected electrons;

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a step of computing a sum of said first and second two-dimensional intensity distributions;

a step of calculating a shape of roughness of an edge of said line pattern from said sum data; and

5 a step of storing said edge roughness shape obtained as image distortion information.

9. The circuit pattern inspection method according to claim 8, further comprising a step of calculating an image offset amount
10 in the direction perpendicular to an edge of a line pattern in an observation area from said image distortion information obtained and correcting a third two-dimensional intensity distribution of secondary electrons or reflected electrons obtained as a result of observing an arbitrary sample or a pattern
15 edge position obtained from said third two-dimensional intensity distribution.

10. A circuit pattern inspection method of inspecting a pattern shape on the basis of two-dimensional distribution information
20 of intensities of secondary electrons or reflected electrons obtained by observing a pattern formed on a substrate by a scanning microscope using a charged particle beam, comprising:

a step of detecting a set of edge points indicative of positions of edges of said pattern in a two-dimensional plane
25 from said two-dimensional distribution information by a

threshold method;

a step of obtaining an approximation line for the set of edge points belonging to said edge detected;

a step of obtaining an edge roughness shape by calculating
5 the difference between the set of said edge points and said approximation line; and

a step of selecting a candidate of a pattern forming process on said substrate as a cause of occurrence of roughness from said edge roughness shape obtained and displaying the candidate,

10 wherein a plurality of values are used as thresholds used for said threshold method.

11. A circuit pattern inspection apparatus comprising:

a charged particle source;

15 a charged particle optical system for irradiating a sample with a charged particle beam emitted from said charged particle source through a condenser lens, a deflector, and an object lens, deflecting the beam, and performing the scan with the beam;

a stage on which said sample is to be mounted;

20 a detector for detecting intensity of a secondary electron or reflected electron emitted from said sample by irradiation of said charged particle beam;

a control system for controlling said deflection and scanning; and

25 signal processing means for obtaining an edge roughness

shape and a characteristic of said pattern on the basis of a threshold method from a two-dimensional distribution of intensities of said secondary electrons or reflected electrons obtained.

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